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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|--|-------------|----------------------|---------------------|------------------|
| 10/702,234 | 11/06/2003 | Rajesh Khamankar | TI-33223 | 7943 |
| 23494 | 7590 | 06/10/2005 | EXAMINER | |
| TEXAS INSTRUMENTS INCORPORATED P O BOX 655474, M/S 3999 DALLAS, TX 75265 | | | | HA, NATHAN W |
| | | | ART UNIT | PAPER NUMBER |
| | | | 2814 | |

DATE MAILED: 06/10/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

JZ

| | | |
|------------------------------|-----------------|------------------|
| Office Action Summary | Application No. | Applicant(s) |
| | 10/702,234 | KHAMANKAR ET AL. |
| | Examiner | Art Unit |
| | Nathan W. Ha | 2814 |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) Responsive to communication(s) filed on 22 March 2005.

2a) This action is FINAL. 2b) This action is non-final.

3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) Claim(s) 1-11 is/are pending in the application.

4a) Of the above claim(s) 9-11 is/are withdrawn from consideration.

5) Claim(s) _____ is/are allowed.

6) Claim(s) 1-8 is/are rejected.

7) Claim(s) _____ is/are objected to.

8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9) The specification is objected to by the Examiner.

10) The drawing(s) filed on _____ is/are: a) accepted or b) objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a) All b) Some * c) None of:
 1. Certified copies of the priority documents have been received.
 2. Certified copies of the priority documents have been received in Application No. _____.
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

| | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____ | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 1-3 and 6-7 are rejected under 35 U.S.C. 102(e) as being anticipated by Lahaug, US 6,716,685, previously cited.

In regard to claims 1, 6 and 7, in figs. 1a-5, Lahaug discloses a method for forming MOS transistor gate dielectrics (title), comprising:

providing a semiconductor substrate 11 (col. 3, line 47);

forming a first dielectric layer 18 on said semiconductor substrate (col. 2, line 41);

performing a first plasma nitridation of said first dielectric layer (col. 2, lines 50-53);

removing said first dielectric from a region of said substrate (col. 3, lines 50-52);

forming a second dielectric layer 30 on said semiconductor substrate in said region from which said first dielectric layer were removed; and

simultaneously performing a second plasma nitridation, reoxidized, of

said second dielectric layer and said first dielectric layer (col. 4, lines 5-14).

In regard to claims 2 and 3, the oxide layers as mentioned above are silicon oxide. Silicon Oxide is generally mentioned in a gate of a transistor as oxide (see col. 1, lines 9-14.)

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 4-5 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lahaug as applied to claims 1-3 and 6-7 above, and further in view of Chau et al. (U.S. Patent No. 6,087,236, previously cited, hereinafter, Chau.)

In regard to claims 4-5 and 8, Lahaug is shown to teach all the claimed limitations as mentioned above with the exception of incorporating 5-15 and 5-20 atomic percent in the plasma nitridation into the dielectric layers.

Chau, in figs. 15-18, discloses an analogous device including a substrate 102, double gate oxides 106 and 115 formed by nitridation process (col. 5, lines 44-55) the teaching further includes a step of incorporating less than 3 to 30 atomic percent of nitrogen into the dielectric layer (110) by simultaneously exposing the third dielectric layer and the second dielectric layer (106) to a nitrogen containing plasma (see Fig. 8,

col. 5, 33-45 and col. 6, lines 47-65). These percentages are appropriately close to the range of the percentages as claimed.

Therefore, it would have been obvious to one having ordinary skill in the art at the time of invention was made to incorporate nitrogen into the dielectric layer of Lahaug as taught by Chau to form devices of different characteristics in a substrate, CMOS, since the concentration of the nitrogen plays an importance role in the step of making the dielectric layer, for example, the layer's characteristics, which controls the threshold voltage since nitrogen prevents "holes" from penetrating into the layer.

Generally, differences in concentration or temperature will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such concentration or temperature is critical. "[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955) (Claimed process which was performed at a temperature between 40°C and 80°C and an acid concentration between 25% and 70% was held to be prima facie obvious over a reference process which differed from the claims only in that the reference process was performed at a temperature of 100°C and an acid concentration of 10%).

Response to Arguments

5. Applicant's arguments filed 9/15/04 have been fully considered but they are not persuasive. For instance, Applicants contend that the cited art does not disclose the

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step of simultaneously performing a plasma nitridation. This step, as mentioned above, is disclosed in Lahaug's col. 4, lines 5-11.

Conclusion

6. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nathan W. Ha whose telephone number is (571) 272-1707. The examiner can normally be reached on M-TH 8:00-7:00(EST).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy can be reached on (571) 272-1705. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Nathan Ha
June 2, 2005



HOAI PHAM
PRIMARY EXAMINER